Unit 3

Basic Building Construction

INTRODUCTION

As you know, plumbing fittings and fixtures are installed at various places in the building structure. These include the bathroom, kitchen, washroom, roof, etc. As a plumber has to install these at the appropriate locations, it is important that one is aware of the names of the components of a building. This Unit will explain all the components in detail. .

Plumbing in a Building

As you know that there are various elements in a building. These elements are foundation, structure, floors and ceiling, exterior walls, windows, roof, internal wall, etc.

Figure 3.1 represents the essential elements of a modern building.

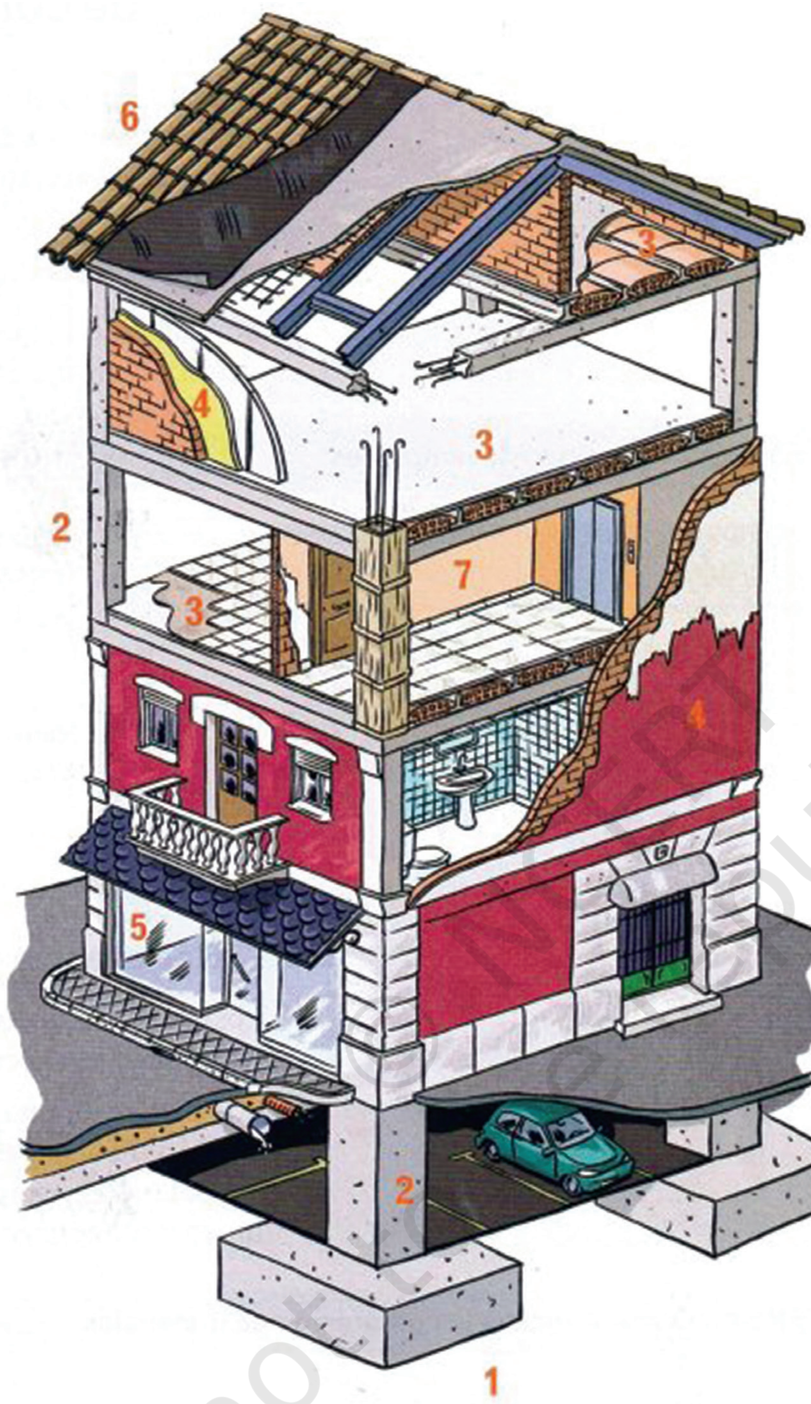

Fig.3.1: Essential elements of a modern building

① **Foundations:** This is a structure (made, mainly, of cement, iron and coarse sand) that transfers loads to the earth. The primary design concerns are settlement and tearing capacity.

② **Structure:** This comprises pillars, beams and tie-beams made of reinforced concrete or iron.

③ **Floors and ceiling:** Hollow tiles are placed between two tie-beams, later it is covered by a layer of concrete, floors are finished with floor tiles or floorboard.

④ **Exteriors walls:** These are usually made by two brick walls and an insulator layer.

⑤ **Windows:** These provide a visual link between internal space and the outside world. They are very important for the mental health of the people in the house. A small tie-beam is place above the window to bear the load of all bricks situated over the window frame.

⑥ **Roof:** Its functions are to protect a building from the weather and to retain the heat generated inside. It comprises of a wood or iron structure, a thermal material, such as fiberglass and the last layer, the tiles or states.

⑦ **Internal walls:** The primary function of internal wall is to divide the overall space within the house into smaller spaces. They are made of brick, wood or plaster.

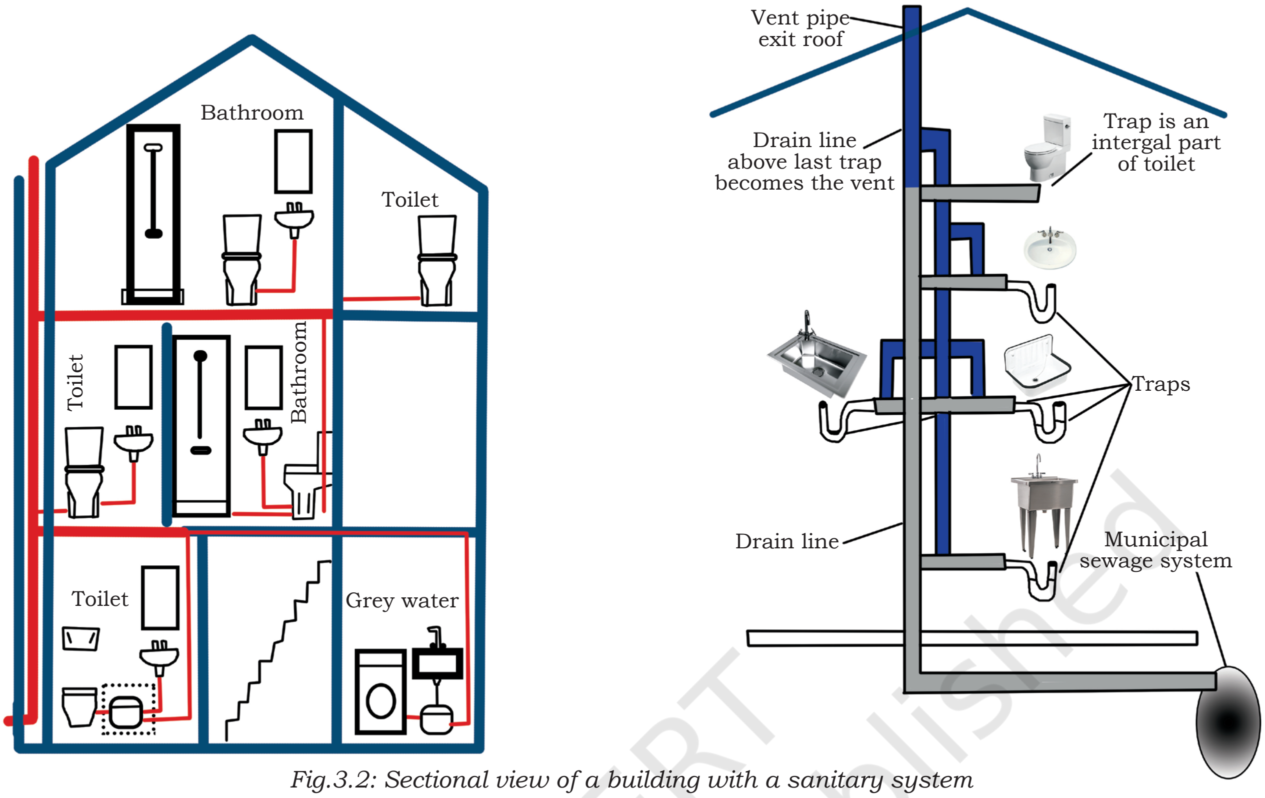

Fig.3.2: Sectional view of a building with a sanitary system

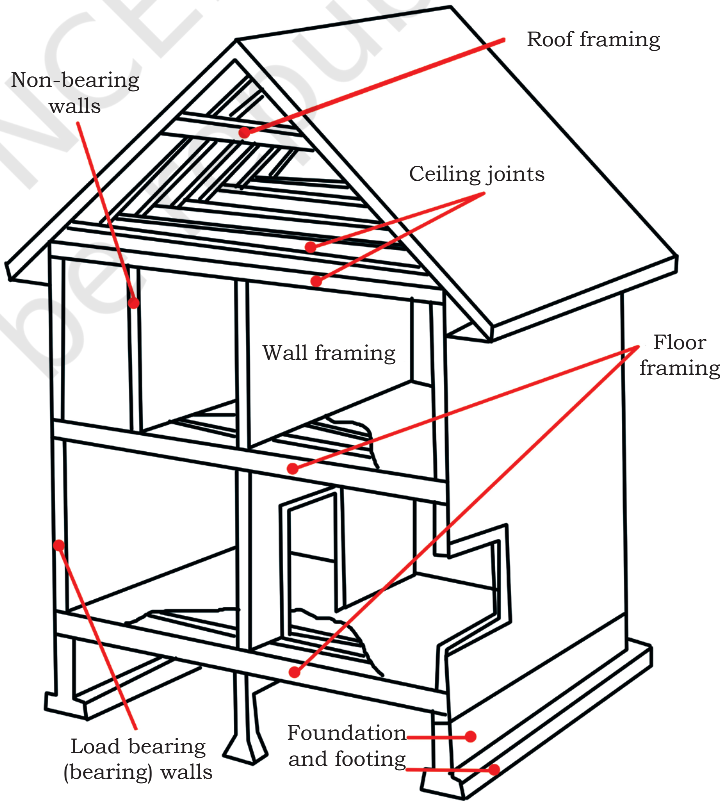

Fig.3.3: Basic elements of a building

Cutting or Opening in Structures

Drilling

A drill is a very powerful and potentially dangerous tool. A drill can easily make holes in the walls. However, the following precautions have to be kept in mind when using a drill.

1. Always check for any electricity cable running through the wall before starting to drill because it can be fatal.
2. Never wear loose clothes or dangling jewellery that could get entangled in the drill as one leans over to use it.
3. The drill bit becomes hot with use, so keep your hands off it.
4. Make sure you use the correct size of the drill bit for the type of wall you are drilling into.
5. If you are drilling into tiles, use a special tile drill bit and stick a little piece of masking tap or faucet over the area to stop the drill from wandering.
6. If you are drilling into a plaster board, tap the wall to find where it is not hollow. This will be where the wooden joint is—aim to drill only into this.
7. Always use a an extension cord made for this purpose, as a longer wire is needed for the drill and never pick up the drill by its flex.

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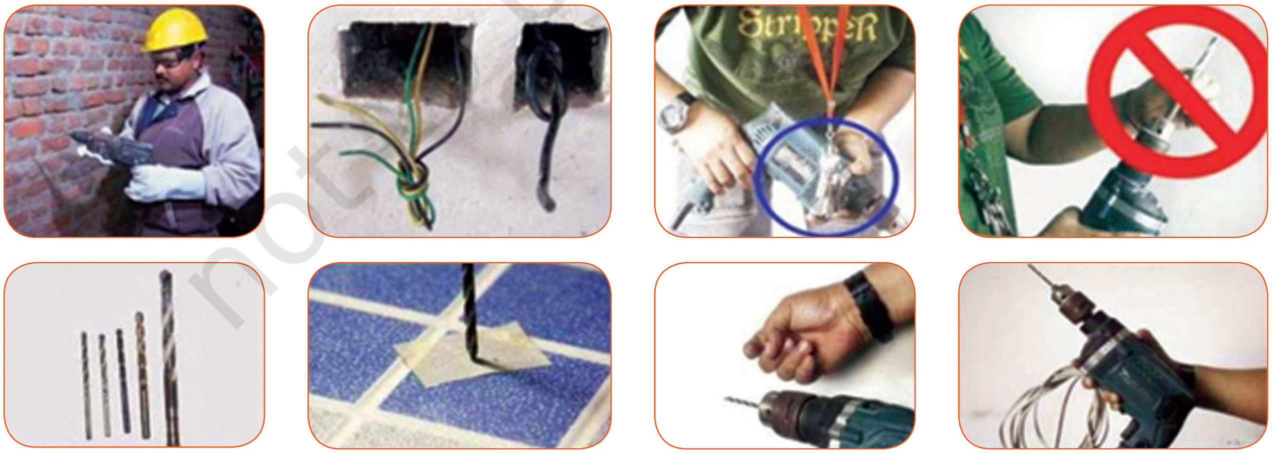


Fig 3.4: Precautions to be taken while using a drill

NAILING

Nailing is done to fasten to a surface or to something else with a nail and a hammer. The different types of nails used are shown in Fig. 3.5.

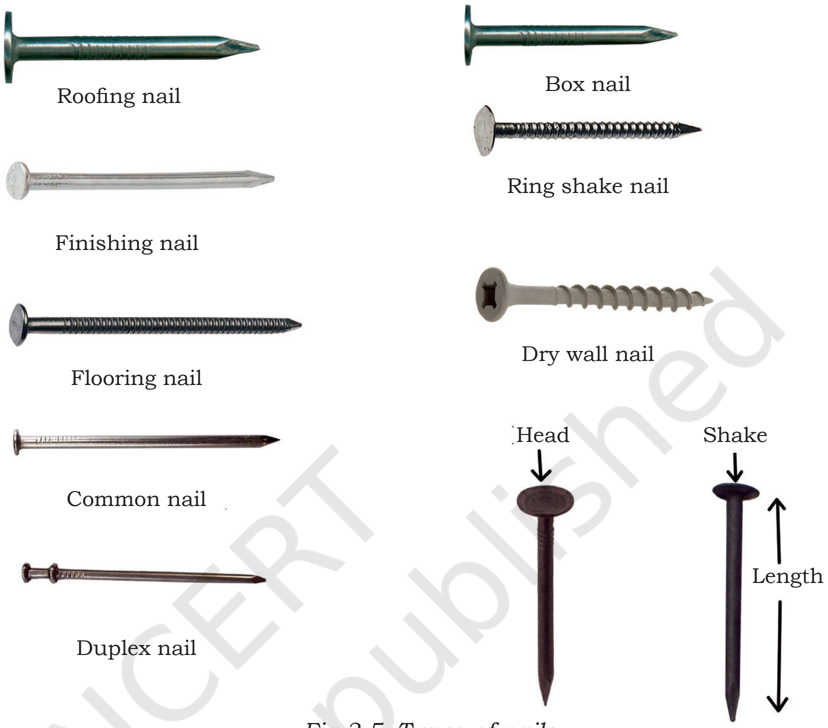


Fig.3.5: Types of nails

CORE CUTTING

Chase or core is to bury (or, in builders' terms, chase) running cables or pipes up (or along) a masonry wall.

When a space is created in a wall for keeping the plumbing pipes. It is called chase. Chase cut-outs should always be vertical or horizontal between start and finish on the wall.

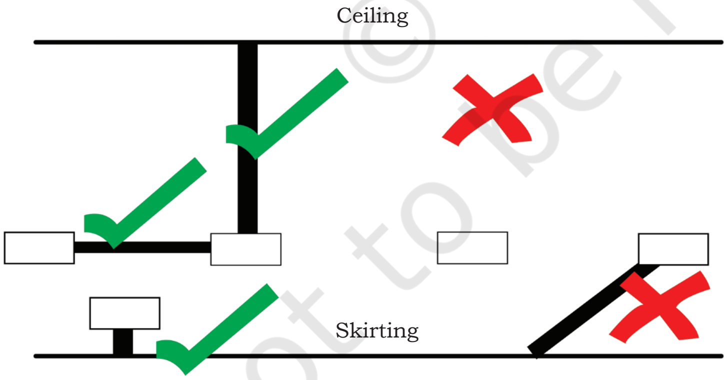


Fig.3.6: Core Cutting and Tools

1. Never cut a chase at an angle between these two, nor step the channel.
2. While making vertical chase, care should be taken that the chase depth should not be more

than one-third of the wall thickness.

3. Similarly, for horizontal chase, the width of the depth of cut should be more than the sixth of wall thickness.
4. Chases on opposite sides of a wall should not be in line, that is, ‘back to back’.
5. It should be noted, that if chasing in a cable, any new wiring circuit falls under Part P of the Building Regulations.

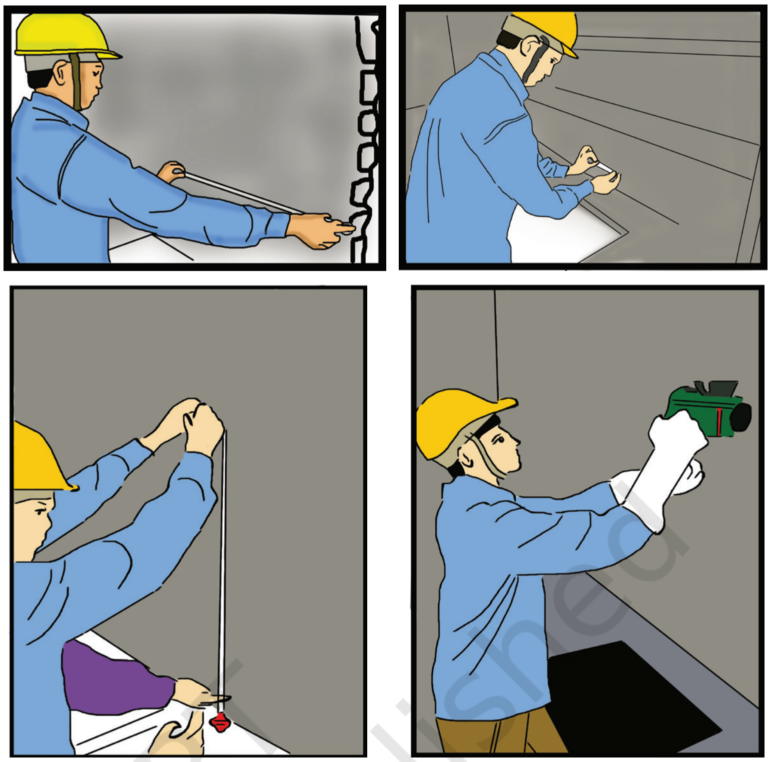


Fig. 3.7 (a): Types of Masonry Tools

Basic Masonry Tools

(a) Trowels: Trowel is used in masonry work. It is used to pick up mortar from a board and to place and spread the mortar into a brick or set of bricks. It secures a brick into the mortar by tapping. Sizes of trowel vary and can reach up to 11 inches in length and 8 inches in width. Masons prefer using short and wide trowels since they do not put excessive stress on wrists.

(b) Chisels: A chisel is used to cut bricks into specific sizes. Chisel width ranges from 2 ½ to 4 ½ inches.

(c) Hammer: A masonry hammer has a square face on one end for breaking; it has a sharp edge on the other for cutting. They are used to split hard bricks.

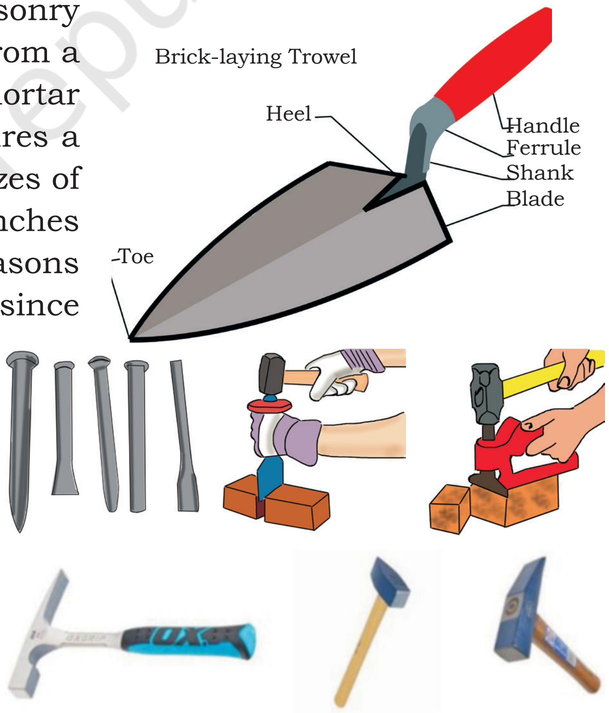


Fig. 3.7 (b): Types of Masonry Tools

NOTES

PREPARATION OF BUILDING MATERIAL OR CEMENT MORTAR

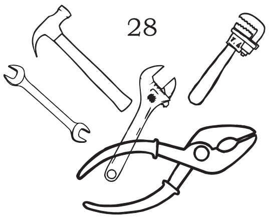
Mortar is a workable paste used to bind construction blocks and fill the gaps between them. Mortar may be used to bind masonry blocks of stone, brick, cinder blocks, etc. Mortar becomes hard when it sets, resulting in a rigid aggregate structure. Modern mortars are typically made from a mixture of sand, a binder, such as cement or lime and water. Mortar can also be used to fix a masonry point when the original mortar has washed away. Mortar is mixed by hand in a mortar box. It should be as watertight as possible.

Method

1. Determining the type of cement will work best for the project.
2. Take fine sand and coarse sand. Take one part cement, two parts sand and three parts coarse sand into the wheelbarrow.
3. Mix the ingredients thoroughly with a spade to ensure they are well blended. Pour a small amount of water and make a paste.

Mortar Filling

Filling mortars can be used for a variety of projects and repairs. Mortar is a necessary filling component to join some home-building components together, such as bricks. It can also be used to patch holes and cracks in basements and foundations, hold a patio together or secure fence posts and mailboxes. Most mortars, a mixture of concrete, lime and sand, are easy to mix and use, in small and large batches. Good mortar is necessary for good workmanship and good masonry service because it must bond the masonry units into a strong well-knit structure.



Practical Exercises

Activity 1

Draw the components of a building.

Material required

1. Drawing copy
2. Rubber
3. Pencil
4. Scale
5. Drawing of building

Procedure

1. Select the drawing of a building.
2. Visit your school building.
3. Now, based on your knowledge of the components of a building, try to identify these components in your school building.
4. Draw the building drawing.
5. Level the components of building

Activity 2

Identify the parts of a hand-drill machine

Material required

1. Hand-drill machine
2. Drill bit
3. Chuck
4. Electrical Power switch

Procedure

1. Remove the power connection of the hand drill machine.
2. Identify the components of hand drill machine.
3. With the help of chuck open the holder of drill bit. Remove the drill bit.
4. Keep the drill bit back in the holder. Tighten the holder with the help of chuck.
5. Plug the wire into the electrical socket. Use the on–off switch of the drill machine and operate it.
6. Identify and make a list of all the components of this drill machine.

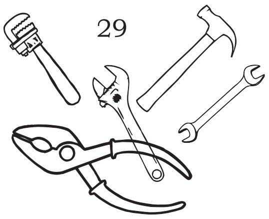
Activity 3

Practice the core cutting in a wall

Material required

1. Chisel
2. Hammer

NOTES



3. Cleaning brush
4. Trowel
5. Scale
6. Old wall (unused)
7. PVC pipe

Procedure

1. Select the wall. Mark the wall.
2. Select horizontal length with the help of scale. Use the chisel and hammer and cut the grooves in the wall.
3. Fit the plumbing pipe in the wall. See the status of the pipe and whether the pipe inserted is loose or fit.
4. Clean the tool and keep the tool in proper place.

Check Your Progress

A. Short answer questions

1. List the components of a building.
2. Why is cutting made in the structure?
3. Why do we use a hand drill machine?

B. Multiple choice questions

1. Components of a building are ________________.
   (a) road (b) playground
   (c) foundation (d) None of these
2. For cutting in the structure we do not use the tool ______________.
   (a) drill machine (b) chisel
   (c) hammer (d) scale
3. Mortar is used for __________________.
   (a) binding masonry block
   (b) binding construction block
   (c) filling the gap between the blocks
   (d) All of these
4. Which is not a part of trowel?
   (a) Toe (b) Handle
   (c) Ferule (d) Cone
5. Horizontal chase should not be deeper than the wall thickness ___________.
   (a) 1/3 (b) 1/4
   (c) 1/5 (d) 1/6

C. Fill in the blanks

1. Mortar is made of mixture of sand, cement and ___________.
2. Drill machine is used for making ___________ in a wall.
3. Chisel is used for making ___________ in the wall.
4. Nailing is done to ___________ a surface.